

Date: Thursday, 3/22/2007 7:46:47 AM  
 User: Kim Johnston

## Process Sheet

Customer : CU-DAR001 Dart Helicopters Services	Drawing Name : X-TUBE 412
Job Number : 31435	
Estimate Number : 12783	
P.O. Number : <i>N/A</i>	Part Number : D412664145
This Issue : 3/22/2007 S.O. No. : <i>N/A</i>	Drawing Number : D412-664-145 <i>U/R</i>
Prsht Rev. : NC	Project Number : <i>N/A</i>
First Issue : <i>N/A</i> Type : LANDING GEAR	Drawing Revision : <i>U/R</i>
Previous Run : 31434	Material : <i>N/A</i>
Written By : <i>[Signature]</i>	Due Date : 3/29/2007 Qty: 1 Um: Each
Checked & Approved By : <i>[Signature]</i> 07.03.22	
Comment : Est Rev: A New Issue 07-02-14 JLM	

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	DC	DOCUMENT CONTROL
-----	----	------------------



Comment: Photocopy bluefile & type labels per PPPD412-664-105	CHG 001	<i>mt</i>
---	---------	-----------

2.0	D6019128	Crosstube Material
-----	----------	--------------------



Comment: Qty.: 1.0000 Each(s)/Unit	Total : 1.0000 Each(s)
------------------------------------	------------------------

Pick:

Qty Part number Description Batch

1 D6019-128 Crosstube 29369

Check OD = 2.7500"; ID =

*MS 07/03/22*

3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
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Comment: MORI SEIKI CNC LATHE LARGE
-------------------------------------

Turn as per Dwg D412-664-145

*MS 07/03/22*

4.0	QC2	INSPECT PARTS AS THEY COME OFF MACHINE
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Comment: INSPECT PARTS AS THEY COME OFF MACHINE
---

*MS 07/03/22*

5.0	QC8	SECOND CHECK
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Comment: SECOND CHECK
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*mt 07/03/23*

6.0	LANDING GEAR 1	LANDING GEAR RESOURCE 1
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Comment: LANDING GEAR RESOURCE 1
----------------------------------

1-Polish entire outside surface of crosstube

*JB 7-3-27*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Thursday, 3/22/2007 7:46:47 AM  
User: Kim Johnston

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31435

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

7.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

DP 7-03-27

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

JD 7-3-27

9.0

QC3/5

INSPECT WORK/WING WALK



Comment: Inspect work & Chemical conversion Coat

DP 7-2-3

10.0

BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-145 using CNC bender program

EL 7-4-4

11.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

7 07-04-12 (1)

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245

2-Ream hole to finish size in tube as per Dwg D412-664-245

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245

} AT 07-04-12

13.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube as per QSI 005 4.1

R 07-04-13 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Thursday, 3/22/2007 7:46:47 AM  
User: Kim Johnston

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31435

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

14.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



07-04-13 ①



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

15.0

QC5

INSPECT WORK TO CURRENT STEP



07-04-13 ①  
LPI



Comment: INSPECT WORK TO CURRENT STEP

16.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 3546 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

07-04-13 ①

17.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

07-04-17

18.0

QC5

INSPECT WORK TO CURRENT STEP



07-04-17 ①



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

19.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

07-04-26

20.0

QC14

Inspect Spray Paint



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

07-05-01

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Thursday, 3/22/2007 7:46:47 AM  
User: Kim Johnston

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31435

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

21.0

D31893

Chafing Shield



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Chafing Shield

Batch: 36959

4T 07-05-25

22.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.0798 sf(s)/Unit Total: 0.0798 sf(s)

Rubber Cushion

Cut to .630" X 4.4" X 4 PCS

Batch: B31948

3T 07-05-25

23.0

D28931

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2893-1

Support

27475

2T 07-05-25

24.0

D2856600

Abrasion Strip



Comment: Qty.: 0.9450 f(s)/Unit Total: 0.9450 f(s)

Abrasion Strip

1X D2856 .250" X 8.42"

Batch: 26650

2T 07-05-25

25.0

MS2192022

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 MS21920-22

Clamp

N/A

optional

26.0

MS2192024

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)

clamp(per MIL-DTL-8783C)

batch: 103002

4T 07-05-25

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes ☐ No ☒ DQA: R2 Date: 07/05/25  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



Date: Thursday, 3/22/2007 7:46:47 AM  
User: Kim Johnston

# Process Sheet 32175

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31435

Part Number: D412664145 -105

Job Number:



Seq. #:

Machine Or Operation:

Description :

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1  
Assemble as per Dwg D412-664-145

Install Chaffing Shield

Instal supports with magnobond 6398 per dwg D412-664-245,  
cure for 12hrs before packaging.

Time & date of application: 1100 03-05-08

Batch: M103 628

ET  
07-05-25

28.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

2005-05-01

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1  
Identify and pack for shipping as per PPP D412-664-105

\*\*\*\*\*Ensure tube is not packaged if curing time is less than 12 hrs, see step 26 for application time & date  
\*\*\*\*\*

Time & date of packaging: 07-05-25 1:00 PM

Location: \_\_\_\_\_

PPP Rev: \_\_\_\_\_

POSITIVE RECALL

EFFECTIVE 07-03-11 AUTH cl

RELEASED u DATE 07-05-25

32175

30.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

07/05/25

Job Completion



u 07-05-25

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

**DART**

DESIGN <i>GP</i>	DRAWN BY <i>GP</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>A</i>	APPROVED <i>A</i>	DRAWING NO. D412-664-145	REV. B SHEET 1 OF 3
DATE 07.03.01		TITLE CROSSTUBE ASS'Y (412 LOW-N FWD) NTS	
A	06.12.21	NEW ISSUE	
B	07.03.01	CHG RUBBER CUSHION	

**PRELIMINARY ISSUE****PARTS LIST:**

Qty	Part Number	Description
X	D412-664-145	CROSSTUBE ASSEMBLY (412 LOW-NARROW FWD)
1	D6019-128	CROSSTUBE
1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-440	RUBBER CUSHION
2	MS21920-22	CLAMP
4	MS21920-24	CLAMP
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6019-128  
FINISHED LENGTH =  $124.48 \pm 0.020$  (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR MS21920-22 CLAMPS AND ASSOCIATED HARDWARE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-24 CLAMPS WITH D3595-063-440 RUBBER CUSHIONS TO SECURE D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB.

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WORK ORDER  
NO. 31435

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DART AEROSPACE LTD		Work Order: 31435
Description: 412 Low-narrow fuel		Part Number: D412-664-145
Inspection Dwg: D412-664-145 Rev: B		Page 1 of 1

### FIRST ARTICLE INSPECTION CHECKLIST



First Article



Prototype

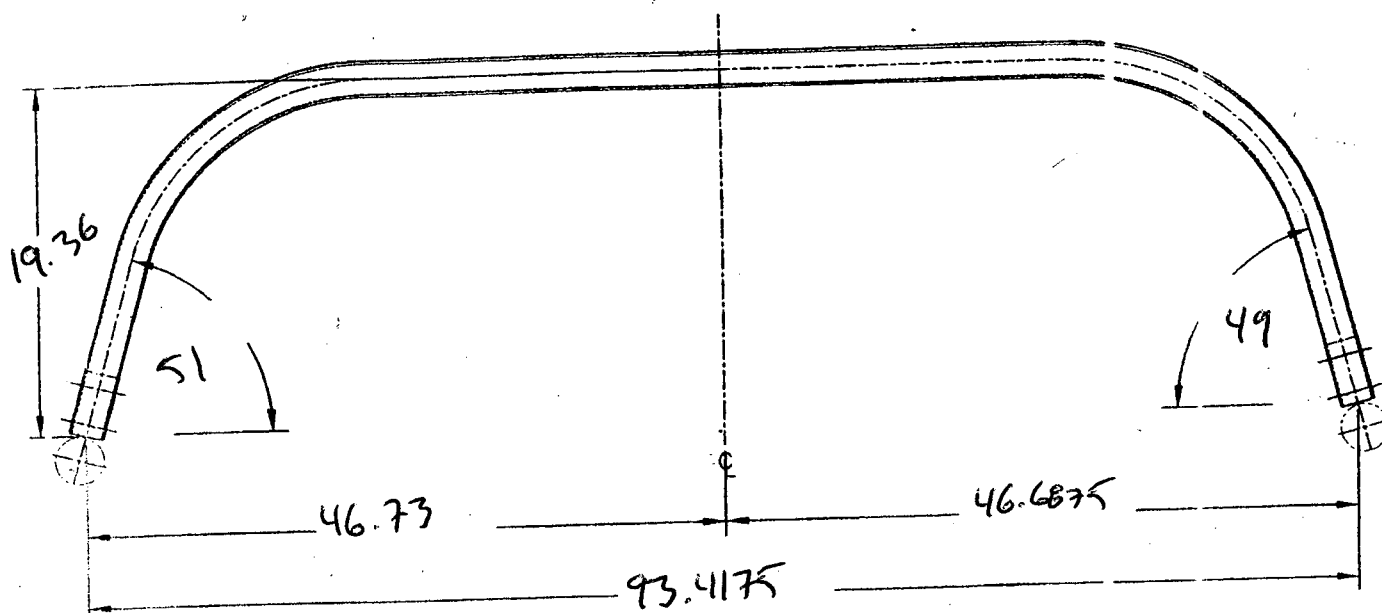
Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
A	2.740	+0.005 -0.000	2.742	✓			
B	2.490	"	2.492	✓			
C	2.551	"	2.560	✓			
D	2.624	"	2.626	✓			
E	2.692	"	2.694	✓			
F	2.750	"	2.751	✓			
G	124.48	±0.020	124.48	✓			
H							
I							
J							
K							
L							
M							
N	2.740	+0.005 -0.000	2.743	✓			
O	2.490	"	2.492	✓			
P	2.551	"	2.559	✓			
Q	2.624	"	2.627	✓			
R	2.692	"	2.695	✓			
S	2.750	"	2.751	✓			
T							
U							
V							
W							
X							
Y							

Measured by: MS	Audited by: <i>[Signature]</i>	Prototype Approval:	N/A
Date: 07/03/22	Date: 07/03/23	Date:	N/A

Rev	Date	Change	Revised by	Approved
		New Issue	KJ/RF	

<b>DART AEROSPACE LTD</b>		<b>Work Order</b>	31435
<b>Description:</b> Crosstube Low Narrow Aft (412)		<b>Part Number:</b>	D412-664-145
<b>Inspection Dwg:</b> D412-664-145		<b>Rev:</b> B	Page 1 of 1

Required Dimension	Min	Max
Height	19.33	19.49
1/2 Span	46.47	46.73
Angle	49	52
Total Span	92.94	93.46



Comments

QC15 Inspection	<i>[Signature]</i>
Date	
	07.04.12

Rev	Date	Change	Revised by	Approved
A	07.03.29	New Issue	KJ/ M	<i>[Signature]</i>



# HeathAir

INTERNATIONAL (1991) INC.

681 Ave. Lepine, Dorval, Québec H9P 1G3  
Tél.: (514) 636-1000 • Fax: (514) 636-0031

W.O. N° 36169

A.M.O. Number: 46/90

## NON-DESTRUCTIVE TESTING REPORT

### AIRCRAFT / COMPONENT INFORMATION

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL HR/LDG:

OPERATED BY:

BASED AT:

### INSPECTION REQUIREMENTS

Carry out FPI of five (5) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty. (1) P/N D412-664-245 S/N B31437  
Qty. (2) P/N D412-664-145 S/N's B31435 & B31139  
Qty. (2) P/N D412-664-201 S/N's B29531 & B29506

☐ RADIOGRAPHY

☐ ULTRASONIC

☒ PENETRANT

☐ MAGNETIC PARTICLE

☐ EDDY CURRENT


### INSPECTION REPORT

Fluorescent penetrant inspection was performed in accordance with the above requirements on five (5) cross tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)  
Ardrox 970P25E Batch #04B503.

Fuve (5) cross tubes PASSED inspection.

THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH  
THE APPLICABLE STANDARDS OF AIRWORTHINESS

INSPECTED BY:   
S. FLEKHER

DATE April 16, 2007

INSPECTION STAMP(S) Not Required

### CUSTOMER INFORMATION

CUSTOMER: Dart Aerospace

P.O. NUMBER

3546

ADDRESS:

CONTACT NAME:

LABOUR	@	\$
MATERIALS	@	
TRAVEL EXPENSES	@	GST
HC TEL EXPENSES	@	PST

INVOICE NO.

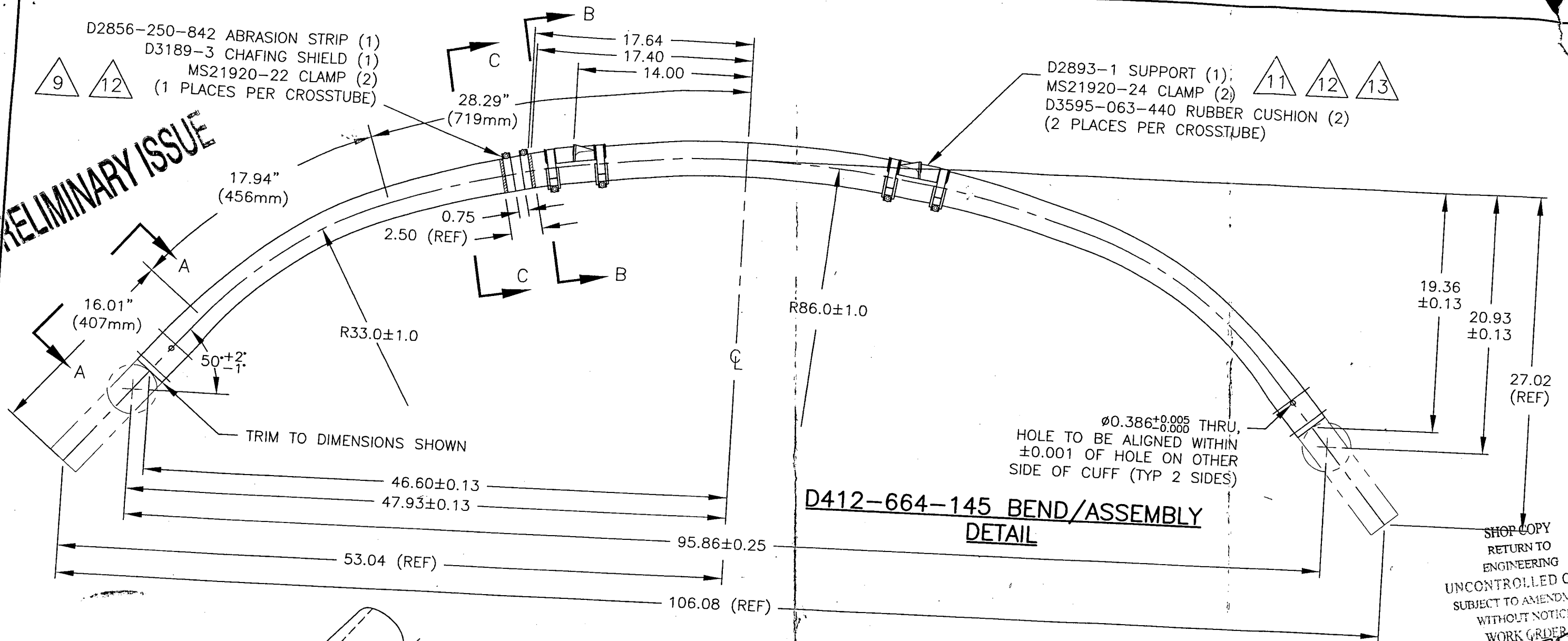
TOTAL \$

WHITE COPY - INSPECTION FILE • YELLOW COPY - CUSTOMER • PINK COPY - ACCOUNTANT

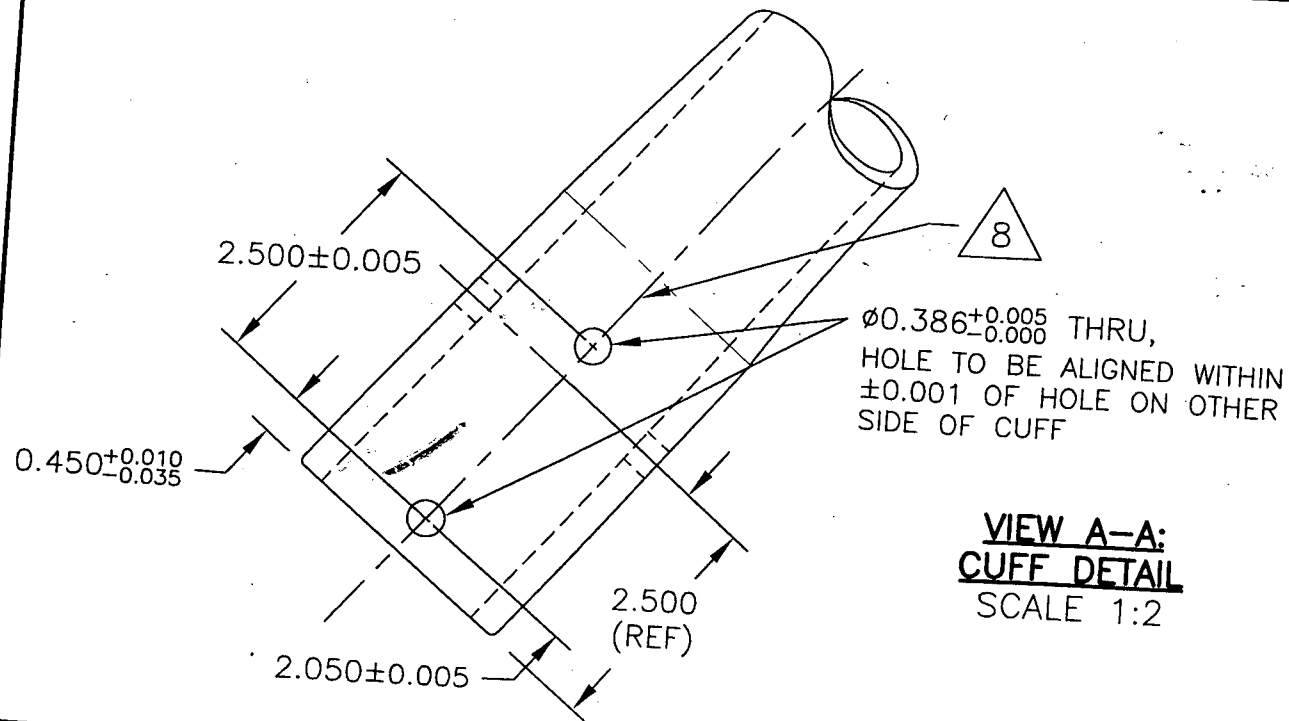
**PRELIMINARY ISSUE**

D2856-250-842 ABRASION STRIP (1)  
 D3189-3 CHAFING SHIELD (1)  
 MS21920-22 CLAMP (2)  
 (1 PLACES PER CROSSTUBE)

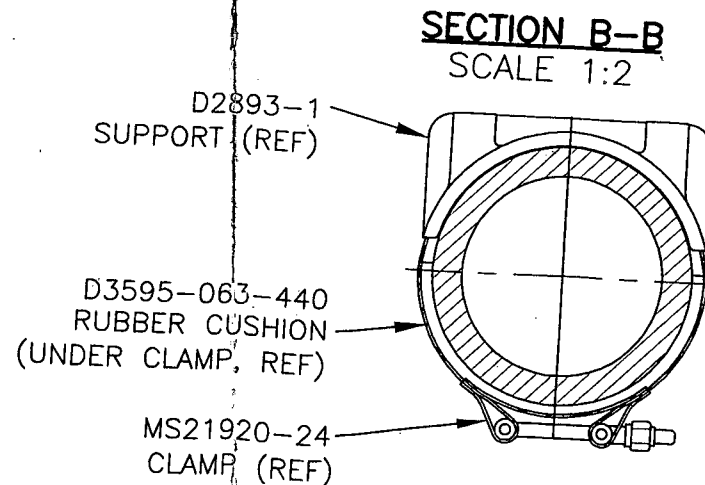
D2893-1 SUPPORT (1)  
 MS21920-24 CLAMP (2)  
 D3595-063-440 RUBBER CUSHION (2)  
 (2 PLACES PER CROSSTUBE)



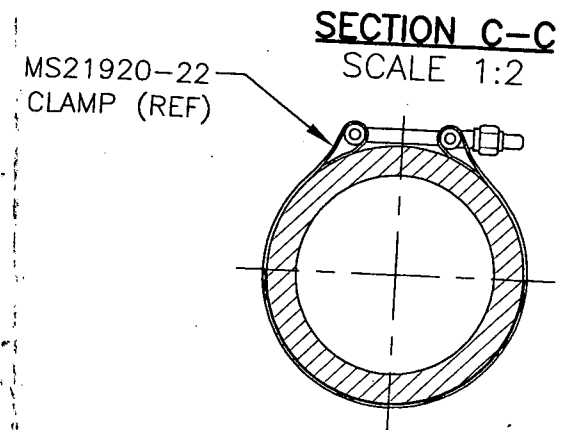
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 NO. 31435



**VIEW A-A:  
 CUFF DETAIL**  
 SCALE 1:2



**SECTION B-B**  
 SCALE 1:2



**SECTION C-C**  
 SCALE 1:2

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DESIGN *qp*  
 CHECKED *qp*  
 DATE 07.03.01

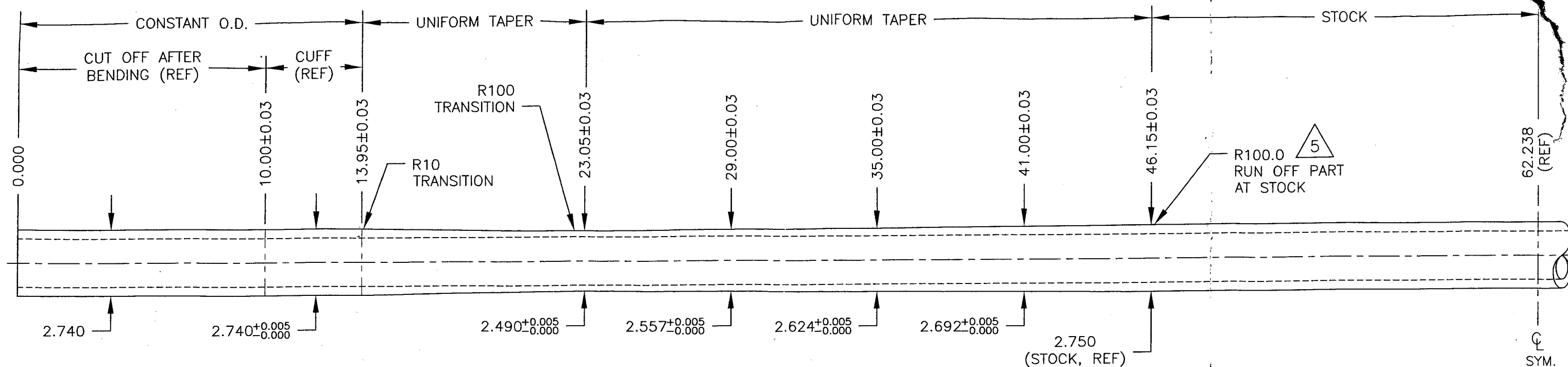
DRAWN BY *qp*  
 APPROVED *qp*  
 TITLE CROSSTUBE (412 LOW-NARROW FWD)

**DART AEROSPACE LTD.**  
 HAWKESBURY, ONTARIO, CANADA

REV. B  
 SHEET 2 OF 3  
 SCALE 1:8







# **D412-664-145 MACHINING DETAIL**

**PRELIMINARY ISSUE**

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WORK ORDER  
NO. 31435

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DATE 07.03.01		TITLE CROSSTUBE (412 LOW-NARROW FWD) SCALE 1:4		

REV. B

SHEET 3 OF 3

